

HOTTER ON METALS: Elysis could revolutionize aluminium smelting technology

Two of the world's largest aluminium producers are teaming up with Apple and the governments of Canada and Quebec in a technology joint venture that could revolutionize the sector.

Alcoa and Rio Tinto equally own the majority of [the joint venture, to be called Elysis](#), with the government of Quebec holding a small equity stake of 3.5%.

Alcoa had been quietly working on the technology to produce emissions-free metal for some time: it began in 2009 at the US producer's Pittsburgh Technology Center, with around 700 tonnes produced so far.

The next phase will scale-up the technology with a second pilot plant to be installed in Quebec before another scale-up to industrial size. The technology package will be offered to the market by 2024, from when it can be licensed for retrofitting existing facilities or the construction of new plants.

Smelting technology is an area that Rio Tinto knows well, albeit in a more traditional sense. The company's AP Technology is used at around 9.1 million tonnes of global production capacity, and the firm is a western world leader in smelter technology development and commercialization.

It's not the first time the aluminium world has tried to be more green: efforts to produce low-carbon metal that reduces emissions – and which also attracts a premium price - have been around for a while.

Rio Tinto already has RenewAl, while Alcoa has Sustana. Last year, UC Rusal launched ALLOW, and said it would sell no less than 1 million tonnes of this metal to customers by 2021; it's unclear where that goal stands since the [US sanctions were announced last month](#), however.

What's different about this new technology is that it will produce oxygen while cutting out all direct greenhouse gas emissions from the traditional smelting process. At a time of increasingly stringent environmental regulations and a drive to slash emissions, there's an obvious appeal to aluminium producers as well as their customers around the world.

On average, the aluminium industry currently generates 12 tonnes of carbon dioxide (CO₂) emissions per tonne of aluminium at the smelter, analysts estimate.

Environmental benefits aside, it will boost the anode life by 30 times plus cut operating costs by 15% and increase productivity by the same amount, something that no smelter is likely to turn its nose up at either.

Neither Alcoa nor Rio Tinto said whether they plan to refit their own operations, but it would seem inevitable that this will be the way forward for at least some facilities and the likely path for new ones going forward.

Rio Tinto, which acquired Alcan in 2007 and catapulted itself into the aluminium production big league, operates a large number of facilities in Canada, including smelters such as Kitimat – which produced 433,000 tonnes last year using AP Technology – as well as the Vaudreuil alumina refinery and numerous hydropower stations.

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It also operates the small but highly efficient Arivda smelter, which uses AP60 Technology that produces 40% more aluminium per cell than previous generations of the technology.

For its part, Alcoa has a joint venture with HydroQuébec called the Manicouagan Power Limited Partnership, which owns and operates the 335 megawatt McCormick hydroelectric project and supplies just over a quarter of the electricity requirements of Alcoa's Baie-Comeau, Quebec, smelter. Alcoa owns 40% of the joint venture, which has a nameplate capacity of 280,000 tonnes per year.

It also operates the Deschambault smelter in Québec, which has a nameplate capacity of 260,000 tpy.

The two aluminium producers also operate a joint venture at Becancour, Quebec. The 413,000 tpy capacity smelter is majority-owned by Alcoa (74.9%) with the remainder held by Rio Tinto.

Apple

The appeal for Apple is also clear.

The US technology firm is not usually public about the names of its suppliers of aluminium, and has shied away from commenting on them in the past. Apple's suppliers have been similarly tight-lipped.

But its public investment in Elysis says a great deal.

Apple recently announced it is now powered with 100% clean energy and has commitments from 23 of its suppliers to do the same.

It's looking to do the same with manufacturing, which makes up 77% of its carbon footprint. Most of it is due to carbon emissions from the electricity used to make its products, and it has set about sourcing lower-carbon materials, partnering with suppliers to reduce their energy use, and helping them switch to renewable energy.

The new technology won't just do that: it'll transform the aluminium manufacturing process to eliminate emissions entirely.

Company co-founder Steve Jobs always had a desire to maintain a green environmental footprint, which meant that aluminium – a 100% recyclable metal – had a headstart when it came to picking his materials of choice.

It's not just its green credentials: aluminium has for some time been viewed as the ideal choice for the company's products because it provides the thinness and lightness needed for portable goods, plus a great strength-to-weight ratio and a slick-looking design.

The company uses it in iPods, Macs, iPads and iPhones as a result.

At the same time, Apple is developing new technologies that allow it to reuse and recycle materials in its products and processes. For a while it's been recycling aluminium in phones for use in the Mac mini computers that form part of its iPhone final assembly facilities.

Changes in aluminium production and suppliers transitioning to renewable energy have meanwhile already cut Apple's greenhouse gas emissions by 2.6 million tonnes. Similarly it has already prioritized aluminium smelted using hydroelectricity rather than fossil fuels, reengineering its manufacturing process to reincorporate the scrap aluminium.

As a result, over the past three years Apple has reduced emissions associated with every gram of aluminium in its iPhones by 83%. For the enclosure of the 13-inch MacBook Pro with Touch Bar, it's a 47% reduction

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compared to that of the previous-generation MacBook Pro.

It won't be just Apple that will be interested. Automakers in particular are increasingly using aluminium and are looking to reduce their emissions through the supply chain as the result of government-mandated programs and regulations across the world.

If original equipment manufacturers (OEMs) will be able to eventually turn to aluminium as a material of choice, then the benefits present a fairly win-win scenario all round.

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